

	Type	L #	Hits	Search Text	DBs	Time Stamp	C o m m e n t s	E r r o r D e f i n i t i o n
1	BRS	L1	49	("4619841" "6067509" "4758353" "5254468" "5397700" "6319312" "6340388" "5239456" "6249712" "5757498" "4555437" "5178422" "5650213" "6078182" "4261970" "6067784" "4775427" "4377129" "4472246" "4492615" "4543163" "4849264" "5192610" "5496585" "6214424" "6214424" "4548579" "6045061" "6200734" "6297038" "6473480" "4256547"	USPAT	2003/05/02 13:40		
2	BRS	L2	37	l1 and (thickness or width or depth)	USPAT	2003/05/02 13:42		
3	BRS	L3	35	l2 and (range)	USPAT	2003/05/02 13:43		
4	BRS	L4	4	l3 and (variation near4 (film or wafer or substrate))	USPAT	2003/05/02 14:03		

	Type	L #	Hits	Search Text	DBs	Time Stamp	C o r r e c t i o n	E r r o r D e f i n i t i o n
5	BRS	L5	35	13 and (industry standard)	USPAT	2003/05/02 14:04		
6	BRS	L6	0	15 and (world near2 standard)	USPAT	2003/05/02 14:05		
7	BRS	L7	1	15 and (statistical near2 analysis)	USPAT	2003/05/02 14:12		
8	BRS	L8	1	17 and (painting adj booth)	USPAT	2003/05/02 14:13		
9	BRS	L9	1	18 and (color adj group)	USPAT	2003/05/02 14:13		
10	BRS	L10	1	19 and (time adj frame)	USPAT	2003/05/02 14:15		
11	BRS	L11	0	110 and (change near3 cost)	USPAT	2003/05/02 14:18		
12	BRS	L12	0	12 and (statistical adj index)	USPAT	2003/05/02 14:20		
13	BRS	L13	1	12 and (coating near4 cost)	USPAT	2003/05/02 14:56		
14	IS&R	L14	1	("6150023").PN.	USPAT	2003/05/02 14:56		

LEVEL 1

AN 184372615 INPADOC ED 20021002 EW 200239 UP 20030401 UW 200313
 TI FILM THICKNESS MEASURING MONITOR WAFER
 IN EBATA, MAKOTO; FUJITA, FUSAO; SAITO, MAKOTO
 INS EBATA MAKOTO; FUJITA FUSAO; SAITO MAKOTO
 INA JP; JP; JP
 PA MITSUI ENGINEERING & SHIPBUILDING CO., LTD.; ADMAP INC.; EBATA, MAKOTO;
 FUJITA, FUSAO; SAITO, MAKOTO
 PAS MITSUI SHIPBUILDING ENG; ADMAP INC; EBATA MAKOTO; FUJITA FUSAO; SAITO
 MAKOTO
 PAA JP; JP; JP; JP; JP
 TL English; French
 LA Japanese
 DT Patent
 PIT WOA1 PUBL.OF THE INT.APPL. WITH INT.SEARCH REPORT
 FDT with international search report
 PI WO 2002071473 A1 20020912
 DS RW: DE FR GB NL
 W: CN KR US
 AI WO 2002-JP1956 A 20020304
 PRAI JP 2001-60367 A 20010305
 JP 2002-31015 A 20020207
 AIT WOA patent application
 PRAIT JPA patent application
 ICM (7) H01L021-66
 EPC H01L21/66M2
 AB A wafer having a structure of enabling an SiC wafer to be put to
 practical use as a wafer for monitoring a film thickness. The average
 surface roughness Ra of at least one surface of an SiC wafer is set to be
 almost equivalent to the thickness of a film to be formed on an SiC wafer
 to be measured. It is set to be less than an upper limit value which is
 determined as a minimum film thickness of several types, if available, of
 films formed on the SiC wafer to be measured. More specifically, it is
 set to be about 400 times the average surface roughness of a product Si
 wafer, that is, Ra is preferably set to be up to 0.008 μ m.
 Accordingly, a hard and chemically resistant film thickness measuring
 wafer can be practically used, even if not polished to the level of the
 product Si wafer, as a film-thickness-monitoring wafer, thereby providing
 a film-thickness-measuring monitor wafer that can be reduced in polishing
 cost and used semi-permanently.

LEGAL STATUS

AN 184372615 INPADOC UPLS 20021112
 20010305 WOAA A PRIORITY (PATENT)
 JP 2001-60367 A 20010305
20021002
 20020207 WOAA A PRIORITY (PATENT)
 JP 2002-31015 A 20020207
20021002
 20020304 WOAE A APPLICATION DATA
 WO 2002-JP1956 A 20020304
20021002
 20020912 WOAK A1 + DESIGNATED STATES CITED IN A PUBLISHED APPLICATION WITH
 SEARCH REPORT
 CN KR US
20021002
 20020912 WOAL A1 + DESIGNATED COUNTRIES FOR REGIONAL PATENTS CITED IN A
 PUBLISHED APPLICATION WITH SEARCH REPORT
 DE FR GB NL
20021002

20020912 WOA1	+ PUBLICATION OF THE INTERNATIONAL APPLICATION WITH THE INTERNATIONAL SEARCH REPORT	
	20021002
20021106 WO121	EP: THE EPO HAS BEEN INFORMED BY WIPO THAT EP WAS DESIGNATED IN THIS APPLICATION	
	20021112

Set	Items	Description
S1	7829416	MONITOR? OR OBSERV? OR EXAMIN? OR CHECK? OR SUPERVIS?
S2	4025364	VARIATION OR VARYING OR VARY OR VARIES OR DIFFERENC?
S3	4012981	FILM? OR COAT? ? OR COATING? ? OR COATED
S4	2557884	THICKNESS? OR WIDTH OR BREADTH OR DEPTH
S5	2185721	WORK()PIECE? OR WORKPIECE? OR WAFER? OR SUBSTRATE?
S6	17694711	MEASUR? OR CALCULAT? OR COMPUT? OR DETERMIN? OR EVALUAT?
S7	3254609	COST? OR BILL OR BILLS OR BILLING? OR PAYMENT? OR FEE OR -
		FEES OR PAY? ? OR PAYING OR PRIC????
S8	14523	S1 AND S2 AND S3 AND S4
S9	3027	S1(10N)S2(10N)S3(10N)S4
S10	839402	S6 AND S7
S11	269993	S6(10N)S7
S12	190489	S6(5N)S7
S13	2	S9 AND S5 AND S12
S14	34	S10 AND S5 AND S8
S15	31	RD (unique items)
S16	29	S15 NOT S13
S17	1262	S1(3N)S3(3N)S4(3N)S5
S18	14	S17 AND COST?
S19	12	RD (unique items)
S20	11	S19 NOT S16

? show files

File 315:ChemEng & Biotec Abs 1970-2003/Mar
(c) 2003 DECHEMA

File 2:INSPEC 1969-2003/Apr W2
(c) 2003 Institution of Electrical Engineers

File 6:NTIS 1964-2003/Apr W4
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File 8:Ei Compendex(R) 1970-2003/Apr W2
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File 34:SciSearch(R) Cited Ref Sci 1990-2003/Apr W3
(c) 2003 Inst for Sci Info

File 434:SciSearch(R) Cited Ref Sci 1974-1989/Dec
(c) 1998 Inst for Sci Info

File 99:Wilson Appl. Sci & Tech Abs 1983-2003/Mar
(c) 2003 The HW Wilson Co.

File 94:JICST-EPlus 1985-2003/Apr W3
(c)2003 Japan Science and Tech Corp(JST)

File 65:Inside Conferences 1993-2003/Apr W3
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File 35:Dissertation Abs Online 1861-2003/Mar
(c) 2003 ProQuest Info&Learning

File 583:Gale Group Globalbase(TM) 1986-2002/Dec 13
(c) 2002 The Gale Group

File 474:New York Times Abs 1969-2003/Apr 24
(c) 2003 The New York Times

File 475:Wall Street Journal Abs 1973-2003/Apr 24
(c) 2003 The New York Times

File 347:JAPIO Oct 1976-2002/Dec(Updated 030402)
(c) 2003 JPO & JAPIO

File 350:Derwent WPIX 1963-2003/UD,UM &UP=200324
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16/9/9 (Item 2 from file: 6)
DIALOG(R) File 6:NTIS
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0834322 NTIS Accession Number: DOE/JPL/954896-1/XAB
Vitre-Graf Coating on Mullite. Low Cost Silican Solar Array Project:
Large Area Silicon Sheet Task. Final Report, December 14, 1977-June 13,
1979

Rossi, R. C.
Tylan Corp., Torrance, CA.
Corp. Source Codes: 9509687
Sponsor: Department of Energy, Washington, DC.
1979 83p
Languages: English
Journal Announcement: GRAI8020; NSA0500
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email at orders@ntis.fedworld.gov. NTIS is located at 5285 Port Royal Road,
Springfield, VA, 22161, USA.

NTIS Prices: PC A05/MF A01

Country of Publication: United States

Contract No.: NAS-7-100-954896

A technical and economic evaluation was made of a proprietary glass-like carbon glaze coating applied to mullite and graphite to be used either in thin-film silicon manufacture or in container ware applications. Preliminary evaluations had indicated that the glassy carbon coating reacts with molten silicon to form a silicon carbide reaction layer that may serve as a diffusion barrier to prevent silicon reaction with the substrate material. The technical evaluation consisted of manufacturing test samples by varying materials and processing parameters in conformance with a pre-selected matrix. Various tests, primarily coating appearance, adherence and silicon reaction behavior was observed as a function of the test parameter variation. The results of these tests indicated that most graphite and carbonaceous materials used as substrates will produce a visually acceptable coating having excellent adherence over a wide range of processing parameters. However, no set of parameters produced a coating that could withstand the chemical attack from molten silicon and prevent reaction with a graphite substrate. The primary consideration of graphite substrates was in container ware applications requiring long-time molten silicon exposure. The conclusion of this study suggested that the glassy carbon coating might provide protection for time periods of 30 minutes or less, and therefore was not suitable for the intended application. The economic analysis generated a process based on the selected parameters for coating glassy carbon onto newly developed mullite substrate material. By using the interim standard price estimating equation a projected cost of \$1.30/m exp 2 was calculated based on 1975 dollars. (ERA citation 05:021982)

Descriptors: Graphite; *Mullite; *Silicon; Adhesion; Carbon; Coatings ; Crucibles; Dip coating ; Dipped coatings ; Economics; Etching; Films ; Impurities; Ion microprobe analysis; Manufacturing; Paints; Porosity; Quantitative chemical analysis; Resins; Sample preparation; Scanning electron microscopy; Silicon carbides; Silicon solar cells; Substrates ; Thickness

Identifiers: ERDA/140501; ERDA/360601; NTISDE

Section Headings: 97N (Energy--Solar Energy); 71E (Materials Sciences--Coatings, Colorants, and Finishes)

16/9/20 (Item 1 from file: 35)
DIALOG(R)File 35:Dissertation Abs Online
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01873744 ORDER NO: AADAA-I3042976

Synthesis and characterization of sol-gel-derived nanomaterials and nanocrystalline electroless metal coatings

Author: Shukla, Satyajit Vishnu

Degree: Ph.D.

Year: 2002

Corporate Source/Institution: University of Central Florida (0705)

Adviser: Sudipta Seal

Source: VOLUME 63/02-B OF DISSERTATION ABSTRACTS INTERNATIONAL.

PAGE 976. 270 PAGES

Descriptors: ENGINEERING, MATERIALS SCIENCE

Descriptor Codes: 0794

ISBN: 0-493-56850-6

CuS (minimum size of 2.5 nm), Ag₂S (minimum and average size of 2.5 nm and 26 nm respectively), and Au (with minimum size of <10 nm) nanoparticles dispersed within the sol-gel derived hydroxypropyl cellulose (HPC)-silica films are synthesized using the gas diffusion technique. The effectiveness of HPC polymer, as a 'compatibilizer', to synthesize semiconductor and metal nanoparticles distributed uniformly within the silica film is demonstrated. The sol-gel derived HPC-silica films containing dispersed nanoparticles are characterized using x-ray photoelectron spectroscopy (XPS) to understand the mechanism of formation of nanoparticles within the film. The XPS core-level binding energies (B.E.) for the nanoparticles are observed to be sensitive to the variation in the chemical composition at the surface and their size. The 'cluster size effect' is shown to be useful in predicting the average nanoparticle size.

Nanocrystalline ZrO₂ particles are successfully synthesized using sol-gel technique utilizing HPC polymer as a 'steric barrier'. The use of HPC polymer is demonstrated to synthesize submicron-sized, non-agglomerated, and spherical as well as nanocrystalline ZrO₂ particles by adjusting the sol-gel synthesis parameters. The effect of sol-gel synthesis parameters on ZrO₂ nanocrystallite size, its distribution, and the phase evolution behavior of ZrO₂ is studied. The optimum sol-gel synthesis parameters for synthesizing nanocrystalline ZrO₂ with 100% tetragonal phase are identified.

Cu/CuO-ZrO₂ composite powder is synthesized using the electroless metal deposition technique. The mechanism of electroless deposition of Cu over ZrO₂ particle surface is investigated using XPS. On the basis of 'cluster size effect', it is suggested that, the electroless metal deposition process activates the non-catalytic ceramic substrate surface by depositing metallic Pd⁰ clusters and not by the accepted Pd-Sn alloy catalyst. Fly ash cenosphere particle surface is also activated by metallic Pd⁰ clusters under similar coating conditions. The cenosphere particles are further coated with Ag using Pd-activation. The Cu and Ag-coated cenosphere particles find application in manufacturing conducting polymers used for electromagnetic interference (EMI) shielding application. The use of cost-effective activator (AgNO₃) is demonstrated for coating the cenosphere particles with Cu for commercialization. The use of Focussed Ion Beam (FIB) microscopy technique is demonstrated to directly measure the coating thickness.

20/9/2 (Item 2 from file: 2)
DIALOG(R) File 2:INSPEC
(c) 2003 Institution of Electrical Engineers. All rts. reserv.

03443894 INSPEC Abstract Number: A89102816, C89054330

Title: Low cost self ON-OFF auto run vacuum coating system

Author(s): Vora, H.S.; Kumbhare, M.N.; Bemalkhedkar, M.M.

Author Affiliation: Nucl. Res. Lab., Bhabha Atomic Res. Centre, Srinagar, India

Journal: IETE Technical Review vol.5, no.11 p.447-50

Publication Date: Nov. 1988 Country of Publication: India

CODEN: ITREEI ISSN: 0256-4602

Language: English Document Type: Journal Paper (JP)

Treatment: Practical (P)

Abstract: Control circuits for self ON-OFF and sequential operations in a vacuum coating unit, have been designed and tested. The circuits are general in nature and can be easily incorporated in any coating unit. A crystal clock times the self starting, putting the auto vacuum coating system, ON. The thickness of the material coated on the substrate is sensed by a crystal thickness monitor for terminating the process after the preset thickness is reached. This is done by stopping power to filament/boat and covering it by a vane rotated by a stepper motor. The vacuum system is then sequentially put OFF. (1 Refs)

Subfile: A C

Descriptors: physical instrumentation control; vacuum deposited coatings; vacuum deposition

Identifiers: physical instrumentation control; self ON-OFF auto run vacuum coating system; sequential operations; crystal clock; substrate; crystal thickness monitor; vane; stepper motor

Class Codes: A8115G (Vacuum deposition); A0670T (Servo and control devices); C3380D (Physical instruments)

DESCRIPTION OF DRAWING(S) - The figure shows a flowchart representing anodizing system control process.

pp; 21 DwgNo 6/9

Title Terms: ANODISE; SYSTEM; METALLIC; MATERIAL; COATING; AIRCRAFT; INDUSTRIAL; RECEIVE; REFLECT; REFRACT; RADIATE; SUBSTRATE; COATING; BASED ; COATING; THICK; DETERMINE

Derwent Class: M11; P73; V07; X25

International Patent Class (Main): B32B-009/00

International Patent Class (Additional): C25B-009/00; C25C-007/00;

C25D-009/00; C25D-017/00

File Segment: CPI; EPI; EngPI

Manual Codes (CPI/A-N): M11-E; M11-J02

Manual Codes (EPI/S-X): V07-F02A; X25-K05

20/9/9 - (Item 2 from file: 350)

DIALOG(R)File 350:Derwent WPIX

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014862216 **Image available**

WPI Acc No: 2002-682922/200273

XRAM Acc No: C02-192754

XRPX Acc No: N02-539146

Film thickness measuring monitor wafer with reduced polishing costs and good chemical resistance

Patent Assignee: ADMAP KK (ADMA-N); MITSUI ENG & SHIPBUILDING CO LTD (MITB); ADMAP INC (ADMA-N)

Inventor: EBATA M; FUJITA F; SAITO M

Number of Countries: 008 Number of Patents: 002

Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
WO 200271473	A1	20020912	WO 2002JP1956	A	20020304	200273 B
JP 2002334911	A	20021122	JP 200231015	A	20020207	200307

Priority Applications (No Type Date): JP 200231015 A 20020207; JP 200160367 A 20010305

Patent Details:

Patent No Kind Lan Pg Main IPC Filing Notes

WO 200271473 A1 J 19 H01L-021/66

Designated States (National): CN KR US

Designated States (Regional): DE FR GB NL

JP 2002334911 A 7 H01L-021/66

Abstract (Basic): WO 200271473 A1

NOVELTY - A wafer has a structure enabling a silicon carbide (SiC) wafer to monitor film thickness. The average surface roughness Ra of one surface of an SiC wafer is set to the thickness of a film to be formed on an SiC wafer, less than an upper limit value determined as a minimum thickness of several types of films. More specifically, it is set too be about 400 times the average surface roughness of a product Si wafer, 0.008 microns.

USE - Film thickness measuring monitor wafer.

ADVANTAGE - The wafer has reduced polishing costs and can be used semi-permanently. The wafer is hard and chemically resistant.

pp; 19 DwgNo 2/7

Title Terms: FILM; THICK; MEASURE; MONITOR; WAFER; REDUCE; POLISH; COST ; CHEMICAL; RESISTANCE

Derwent Class: L03; S02; U11

International Patent Class (Main): H01L-021/66

File Segment: CPI; EPI

Manual Codes (CPI/A-N): L04-C18

Manual Codes (EPI/S-X): S02-A08A; U11-F01B5

20/9/10 (Item 3 from file: 350)
DIALOG(R)File 350:Derwent WPIX
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014538233 **Image available**

WPI Acc No: 2002-358936/200239

Method for forming semiconductor test wafer

Patent Assignee: SAMSUNG ELECTRONICS CO LTD (SMSU)

Inventor: LEE S M

Number of Countries: 001 Number of Patents: 001

Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
KR 2001107140	A	20011207	KR 200028384	A	20000525	200239 B

Priority Applications (No Type Date): KR 200028384 A 20000525

Patent Details:

Patent No	Kind	Lan Pg	Main IPC	Filing Notes
KR 2001107140	A		1 H01L-021/66	

Abstract (Basic): KR 2001107140 A

NOVELTY - A test wafer formation method is provided to reduce a wastage of wafers and to reduce costs by mounting a test chip on a groove of a mother wafer.

DETAILED DESCRIPTION - A desired thin film is deposited on a wafer for monitoring. The thin film is then patterned. The thickness of the monitoring wafer is reduced by polishing the back side of the monitoring wafer. The polished wafer is then cut in order to form a unit test chip(20) and cleaned. A mother wafer(22) having at least one groove is prepared. The test chip(20) is mounted on the groove of the mother wafer(22). The polishing is a CMP(Chemical Mechanical Polishing).

pp; 1 DwgNo 1/10

Title Terms: METHOD; FORMING; SEMICONDUCTOR; TEST; WAFER

Derwent Class: U11

International Patent Class (Main): H01L-021/66

File Segment: EPI

Manual Codes (EPI/S-X): U11-F01

20/9/11 (Item 4 from file: 350)
DIALOG(R)File 350:Derwent WPIX
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008307437 **Image available**

WPI Acc No: 1990-194438/199026

XRAM Acc No: C90-084085

XRPX Acc No: N90-151305

Monitoring ion supported techniques used on wafers in process chamber - includes determining energy of ions and/or ion beam divergence

Patent Assignee: FRAUNHOFER-GES FORD ANGE (FRAU); FRAUNHOFER GES FOERDERUNG (FRAU); FRAUNHOFER GES FOERDERUNG ANGEWANDTEN (FRAU)

Inventor: HEINRICH F; FRIEDHELM H

Number of Countries: 015 Number of Patents: 009

Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
DE 3910491	C	19900628	DE 3910491	A	19890331	199026 B
WO 9012415	A	19901018				199044

Set	Items	Description
S1	5183497	MONITOR? OR OBSERV? OR EXAMIN? OR CHECK? OR SUPERVIS?
S2	2206669	VARIATION OR VARYING OR VARY OR VARIES OR DIFFERENC?
S3	1446988	FILM? OR COAT? ? OR COATING? ? OR COATED
S4	1131163	THICKNESS? OR WIDTH OR BREADTH OR DEPTH
S5	467950	WORK()PIECE? OR WORKPIECE? OR WAFER? OR SUBSTRATE?
S6	11388659	MEASUR? OR CALCULAT? OR COMPUT? OR DETERMIN? OR EVALUAT? OR ANALY?
S7	11958742	COST? OR BILL OR BILLS OR BILLING? OR PAYMENT? OR FEE OR - FEES OR PAY? ? OR PAYING OR PRIC????
S8	2176	S1(S)S2(S)S3(S)S4
S9	2245438	S6(S)S7
S10	49	S8(S)S9(S)S5
S11	48	RD (unique items)
S12	931	S1(6N)S3(6N)S4(6N)S5
S13	317	S1(3N)S3(3N)S4(3N)S5
S14	8	S13(10N)COST?
S15	4	RD (unique items)
S16	290280	S6(3N)COST?
S17	75706	S3(3N)S4
S18	57	S16(S)S17
S19	21	S16(10N)S17
S20	16	RD (unique items)
S21	16	S20 NOT S15

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File 16:Gale Group PROMT(R) 1990-2003/Apr 24
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File 148:Gale Group Trade & Industry DB 1976-2003/Apr 24
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File 621:Gale Group New Prod.Annou.(R) 1985-2003/Apr 24
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File 275:Gale Group Computer DB(TM) 1983-2003/Apr 24
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File 15:ABI/Inform(R) 1971-2003/Apr 25
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File 9:Business & Industry(R) Jul/1994-2003/Apr 24
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File 349:PCT FULLTEXT 1979-2002/UB=20030417,UT=20030410
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File 348:EUROPEAN PATENTS 1978-2003/Apr W03
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?

21/9/1 (Item 1 from file: 16)
DIALOG(R) File 16:Gale Group PROMT(R)
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09772131 Supplier Number: 85898089 (THIS IS THE FULLTEXT)
**Tevet Closes a Strategic Investment, Expands Its Operation and Positions
Company for Growth.**

Business Wire, p0376

May 13, 2002

Language: English Record Type: Fulltext

Document Type: Newswire; Trade

Word Count: 539

TEXT:

Business Editors and High Tech Writers

YOKNEA'M, Israel--(BUSINESS WIRE)--May 13, 2002

Industry veteran Yuval Wasserman named as US-based President of the semiconductor metrology company

Tevet Process Control Technologies, a start up company in the area of advanced metrology solutions for the semiconductor industry, today announced the completion of a strategic investment round and the hiring of Yuval Wasserman as the company's President.

The investment round was lead by West-Steag Partners GmbH and also included Deacom Investments Ltd. as well as Tevet's current investors.

"This investment, at this time of industry downturn, is a vote of confidence in the company and its technology and is attributed to the unique nature of Tevet's products," said Ofer Du-Nour, Tevet's founder and Chairman. "It will allow Tevet to expand its operation and restructure for growth."

"Our plan is to use the investment to increase our marketing and product development capabilities including the initial stage of building a worldwide distribution infrastructure, taking full advantage of recent successes. In addition, we seek to leverage the developing recovery in our industry while continuing our innovation through critical integrated and in-situ measurement applications development," commented Du-Nour.

During the last year Tevet focused its efforts on demonstrating and enhancing its integrated metrology solutions in beta sites at leading semiconductor manufacturing companies and processing equipment companies.

Installed in these beta sites, Tevet's ISTMS product has demonstrated its cost -saving capabilities in measuring film thickness while integrated with commercial single wafer CVD processing tools in production environments.

"I am also pleased to announce that Yuval Wasserman has joined Tevet as the company's President," added Du-Nour. "Yuval's experience, coupled with a broad knowledge of the industry and related technologies will provide strong leadership and business savvy, helping Tevet to accelerate the company's initial growth phase".

A twenty-year industry veteran, Yuval Wasserman has a diverse experience in semiconductor processing technology and in semiconductor equipment manufacturing. Prior to joining Tevet, Wasserman was a senior vice president for sales and marketing at Boxer Cross Inc. Prior to that he was the General Manager of Fusion Semiconductor, a division of Eaton Semiconductors (Axcelis) and held executive and managerial positions at AG Associates and National Semiconductor.

"I am excited about Tevet and its products," said Wasserman. "Tevet's integrated metrology solutions are attractive in terms of their performance, economy and return on investment. The company and its products are well positioned to capture the increasing demand for integrated metrology solutions and automatic process control in the market."

About Tevet-PCT: Founded in 1999, Tevet develops innovative metrology and advanced process control solutions for the semiconductor processing industry. Tevet's metrology relies on proprietary broadband

reflectometry as the basis for its integrated and in-situ measurement solutions. Tevet products are uniquely capable of performing simultaneous film thickness measurements, on multiple topographies and stacks, on product wafers and with seamless integration with the wafer processing equipment. In July 2001 Tevet launched its ISTMS integrated metrology module for CVD applications.

Note: digital photo of Mr. Wasserman is available upon request.

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PUBLISHER NAME: Business Wire

INDUSTRY NAMES: BUS (Business, General); BUSN (Any type of business)

21/9/2 (Item 2 from file: 16)

DIALOG(R)File 16:Gale Group PROMT(R)

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08805946 Supplier Number: 76573107 (THIS IS THE FULLTEXT)

Tevet Introduces a New In-Situ Metrology System to Measure Semiconductor Film Thickness.

Business Wire, p2142

July 17, 2001

Language: English Record Type: Fulltext

Document Type: Newswire; Trade

Word Count:- 539

TEXT:

Business Editors/High-Tech Writers

YOKNEA'M, Israel--(BUSINESS WIRE)--July 17, 2001

ISTMS Addresses Industry Need for Advanced Integrated and In-Situ Metrology Solutions; Yield, Throughput and Uptime Can All be Enhanced

Tevet Process Control Technology, a start up company in the area of advanced metrology solutions for the semiconductor industry, today announced the introduction of its ISTMS -- In-Situ Thickness Measurement System, after completion of beta testing in multiple customer sites.

Installed in beta sites just one year ago, the ISTMS has demonstrated its cost-saving capabilities in measuring film thickness while integrated with commercial single wafer CVD processing tools in a production fab.

The ability to measure critical parameters during the manufacturing process could prevent much of the wafer-to-wafer and device-to-device variation in finished products, and speeds the correction time of process excursions.

Tevet's thickness decomposition method(TM) was specifically developed to address the special requirements needed for advanced process control using in-situ or integrated metrology. Tevet's solution relies on rapid, broad spectral analysis using multiple optical sensors positioned above the processed wafer. Multi-point measurements are performed simultaneously.

Integrated measurement modules are integrated with the process tool, within the footprint of the process tool, but outside the process chamber. In addition to the hardware integration, the measurement data is used directly by the process tool to adjust its control parameters on a wafer-by-wafer basis.

In-Situ measurement systems are also integrated in the process tool, but are measuring while the wafer is being processed. The process may be interrupted to make a measurement, then completed based on the measurement feedback, or process and measurements can be performed in parallel. Using in-situ measurements, a fab could theoretically be free of mis-processed wafers because real-time corrections could be made on each wafer.

Examples of what the ISTMS can measure include: multiple films stacked on the product wafer, thickness on top of complicated patterns,

dense structures without the need for pattern recognition or vision, and measurement on moving (or spinning) wafers. Films measured would include oxide, nitride, poly, barrier metals, STI trench, photoresists and SOD (spin-on dielectrics).

"ISTMS entails a new approach for performing integrated and in-situ measurements," said Ofer Du-Nour, president and director of technology of Tevet. "Unlike traditional integrated metrology solutions that rely mainly on re-packaging of existing, classical metrology solutions into a new modular package, Tevet is employing a new measurement scheme that relies on unique technology and algorithms that make it more suitable for in-situ or integrated measurements."

Tevet will market the ISTMS to both IC manufacturers and OEM processing equipment manufacturers that have a clear need for an Integrated Metrology solution as an independent option or as part of an APC (Advanced Process Control) scheme.

About Tevet pct: Founded in 1999, Tevet develops innovative metrology and advanced process control solutions for the semiconductor processing industry. Tevet's solutions rely on its unique measurement modules that are integrated into the processing equipment used for manufacturing of semiconductor devices.

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Cost Issues

To measure and effectively control the cost of a coating operation, a manager must have knowledge of the issues that affect cost. There are a number of issues which establish the framework for a review of operating costs. Some of the key ones are as follows: Quality goals, The substrate and condition of the part. Part preparation and pre-treatment, Racking arrangement, Rework and scrap, Colour changes

The desired or specified level of quality affects the entire process, from pretreatment to the application process, the amount of paint required, the amount of rejects expected, the amount of touch-up, the quality inspection procedure, and even the packaging used. All of these are important cost factors relating to the goals of quality. For instance, since we know that no finishing line can produce 100 per cent flawless product 100 per cent of the time, it makes sense to lower our expectation of quality and accept some blemishes on the back or unseen part of the product, but not on the critical areas. It would represent an unreasonable quality goal to declare a reject for a blemish on an uncritical surface and thus add to the cost for reworking that part.

The substrate and the condition of the part is also a major factor in the cost of coating. Simple parts in high volume with light soils will not cost nearly as much per square foot as complex shapes in low volume with heavy grease or other soils that need to be removed prior to painting.

If cost on this job is originally calculated on the basis of the lighter soil and when the parts that arrive for painting are very different, the paint department's costs will escalate beyond budget. More process time, higher temperatures perhaps, higher cleaner concentrations, and more rejects will all add to the cost to properly finish this part.

Our third issue is racking. Paint racks are costly and universal racks may not be suitable in all cases. If a part requires special racking, this cost must be amortized over the expected number of parts to be painted. If the expected number of parts turn out to have been overestimated, then the cost per part will be higher. Furthermore, the key to throughput and application efficiency is rack density, i.e. the number of parts that can be loaded onto the line in a given time period. If apart, because of shape or size, cannot be loaded as densely as the normal parts on standard racks, that part will cost more than average to paint.

Rework is obviously a major cost factor and often a variable one. Some parts cannot be satisfactorily coated a second time and must be stripped. In some cases, parts cannot be stripped and cannot be recoated, meaning they have to be scrapped. Many parts may have to be sanded before recoating. There are a great deal of variable costs involved in rework, which were probably not in the original cost estimate.

The last major issue is colour change. Downtime for colour change is lost production time and lost revenue. If lost revenue, direct and indirect labour and the cost of cleaning materials are added into the piece cost of a run of 1000 pieces, each part will have a cost of upwards of \$0.05. If the run is 100 pieces, the extra cost due to colour change will be \$0.45 per piece. Identifying this "set-up" cost associated with colour change may help management appreciate the cost of offering many colours in small volumes.

Measuring Cost

Measuring cost in the coating operation should focus on the cost per piece. Every part has its unique aspect, which affects its cost to finish. Some parts are easy to coat, some are harder to coat and result in more rejects. Some require more reinforcement. How accurately can the film thickness be controlled on a specific part?

To calculate the cost of finishing a particular part with a particular coating, use a standard cost accounting formula. It should include the following factors: Material cost, Labour, Plant overhead, Fixed cost, Rework cost.

How long is the run of this part? Are there any quality standards for this part that will increase its expected reject rate? Are there any special features that add to its cost such as two toning or threads?

Estimate the material cost by calculating the cost of the paint or powder per sq ft of coverage. For powder, priced per lb or kg, use 90 per cent utilization, mil thickness of 3 mil, specific gravity of 1.5. For liquid paint, priced per gal or L, use your estimated transfer efficiency times the theoretical coverage of 2 mils times the per cent solids. If you have historical data, use that instead of calculating. Calculate the sq ft area of the part as accurately as possible. Add in a factor for start-up waste and clean up. The material cost per piece will be the cost of covering a square foot with the powder or paint times the sq ft area of the part. Do not forget to add the cost of colour change per piece as described earlier.

For labour costs, add the wage costs for all personnel required to operate the system including, rackers, loaders, masking, blow-off, supervisors and inspectors. Calculate the cost per hour. Divide this number by the number of pieces that can be produced in an hour to arrive at the cost of labour per piece.

Plant overhead numbers as well as the fixed cost numbers should be available from your accounting office. Collect data for a monthly total and divide these numbers by the number of pieces you can produce in that time to arrive at a cost per piece.

Research the reject rate as a percentage of production in a week or use specific numbers for the actual part, if known. If this number is calculated to be 10 per cent of production, then multiply the total cost per piece by 110 per cent. Remember to adjust this number for the cost of scrapping some parts and replacing them, if this is a factor.

The sum of these calculations times the rework percentage should give you an estimated per piece cost. The significance of this number and the activity of calculating it will enable the paint shop manager to compare costs piece by piece or by historical time. It will also allow the paint shop manager to calculate overall paint system operation costs based on hypothetical production rates of specific parts. Many companies already have much of this data within the cost accounting system, but the data cannot be maintained accurately without the input of the paint shop manager.

Controlling costs

Uncontrolled variables make the measured or estimated cost totally unreliable for any budgetary or planning purposes. And worse, these invariably mean higher cost, not lower cost. Vigilance in the areas identified in the cost measurement analysis is necessary.

What factors add to material costs? Answer: too much film thickness, poor transfer efficiency, waste and colour changes.

Which factors increase labour costs? Answer: Increase in reject rate, colour change, unscheduled downtime, changes in process parameters.

Cost control requires management of the process to reduce the impact of these variables. If equipment such as guns, racks, ovens and washer nozzles is in poor condition, the throughput and quality of the system will suffer, resulting in higher cost. Understaffing results in inefficiencies and mistakes. Efficient management means selecting the right equipment, maintaining the equipment on a timely basis, establishment of performance in parts produced, per cent rejects and film build control. Use the developed measurements to create and manage process controls. Develop a well-trained group of workers, with adequate staffing as needed.

Chart III: Cost Per Square Foot for Electrocoat

Variables: Ratio of Resin to Paste, Volume of Solids of Each, Cost per Gallon of Each Transfer Efficiency (95% is an reasonable assumption)

Sq/Ft Coverage Conversion

Products	Volume	Solids	Cost/Gallon	Ratio
Resin		35%	\$17.50	9 to
Paste		28%	\$21.00	1

Parts Resin x Volume Solids = % Solids Mixed

Parts Paste x Volume Solids = % Solids Mixed

10 Parts % Solids Mixed
Film Thickness

Specific Gravity	1 Mils	1.2 Mils	1.5 Mils	1.8 Mils	2 Mils	2.2 Mils	2.5 Mils	2.8 Mils	3 Mils
1.0	192.3	161.0	128.8	107.3	96.6	87.8	77.2	69.0	64.4
1.1	175.6	146.3	117.0	97.5	87.8	79.8	70.2	62.7	58.5
1.2	161.0	134.1	107.3	89.4	80.5	73.1	64.4	57.5	53.7
1.3	148.6	123.8	99.0	82.5	74.3	67.5	59.4	53.0	49.5
1.4	138.0	115.0	92.0	76.6	69.0	62.7	55.2	49.3	46.0
1.5	128.8	107.3	85.8	71.5	64.4	58.5	51.5	46.0	42.9

1.6	120.8	100.6	80.5	67.1	60.4	54.9	48.3	43.1	40.3
1.7	113.6	94.6	75.7	63.1	56.8	51.6	45.4	40.5	37.9
1.8	107.3	89.4	71.5	59.6	53.6	48.7	42.9	38.3	35.8
1.9	101.7	84.7	67.8	56.5	50.8	46.2	40.6	36.3	33.9
2.0	96.6	80.5	64.4	53.6	48.3	43.9	38.6	34.5	32.2

Specific Gravity 4 5
 Mils Mils

1.0	48.3	38.6
1.1	43.9	35.1
1.2	40.3	32.2
1.3	37.2	29.7
1.4	34.5	27.6
1.5	32.2	25.7
1.6	30.2	24.1
1.7	28.4	22.7
1.8	26.8	21.4
1.9	25.4	20.3
2.0	24.2	19.3

Chart 1: Cost Per Square Foot of High Solids Liquid Spray Coatings
 1. % solids x 1604 = theoretical coverage @100% efficiency sq ft/gal, 1 mil thick
 2. theoretical coverage/film thickness x transfer efficiency = actual coverage sq ft/gal
 3. cost per gal/actual coverage = applied cost sq ft
 (*) The number 1604 is the thickness in mils of one gallon of water poured into 1 sq ft box. The number 1923 converts the water to a dry equivalent by dividing 1604 by 8.34 (lb/gal of water)
 Application System/Transfer Efficiency Conventional Air Spray/40% HVLP/30-65% Electrostatic/50-70% Disk or Bell/80-90%

Chart II: Transfer Efficiency

Example: Cost per gallon: \$21.00

Film Thickness: 1.2 mils

% solids: 60%

Application: electrostatic spray

1. $192.3/1.6 = 120$

2. $962/1.2 \times .70 = 561$

3. $21/561 = \$0.0374/\text{sq ft}$

Chart IV: Applied Cost of Powder Coating

$192.3/\text{Specific Gravity} = \text{Theoretical Coverage sq ft/lb}$

$\text{Theoretical Coverage}/\text{Film Thickness} \times \% \text{ Material Utilization} =$

Actual Coverage sq ft/lb

$\text{Cost per lb}/\text{Actual Coverage} = \text{Applied Cost } \$/\text{sq ft}$

192.3 is the coverage of 1 lb of powder at a specific gravity of 1.0 at 1 mil film thickness, 100% efficiency

Example: Specific Gravity: 1.6

% Material Utilization: 95%

Film Thickness: 1.5 mils

Cost per lb: \$3.00

$192.3/1.6 = 120$

$120/1.5 \times .95$

$80 \times .95 = 76$

$3.0/76 = \$0.0394/\text{sq ft}$

(*) Coverage sq ft/lb: The Theoretical coverage of a given powder can be calculate with the formula shown in the applied cost calculation. Chart V provides a guide to coverage at various thicknesses and specific gravities, all at 100% efficiency

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Fluoropolymer coatings go to work.
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Find out how these slippery coating can take the hassle out of your stickiest designs.

Think of a part in which friction, poor release characteristic, corrosion, wear, or noise creates a design impasse. Then rethink the same design using a flouropolymer coating. Chances are that a property applied coating will make those problems disappear.

But there is more to using coatings than knowing which one to specify. Designers must follow application guidelines as well as understand the problem at hand to get the most out of coatings.

High-performance fluoropolymer coatings are low-friction, dry-lubricant materials that combine the strengths of two engineering plastics - flouropolymers, with the lowest coefficient of friction of any solid, and organic polymers that resist high temperatures. Together, they produce a coating that can operate successfully at temperature extremes.

At high temperatures, ordinary fluid lubricants char and turn to ash. At low temperatures, the same fluids turn glassy and brittle. Even dry lubricants, such as molybdenum and graphite, can handle only a limited range of lubricating problems at high temperature and pressure.

Flouropolymer coatings work because they combine a slippery lubricant with a polymer binder or matrix. The soft fluoropolymer lubricant, which smears easily, is protected by the wear-resistant binder. Binders also help to hold the lubricating particles in place, and allow them to adhere to a variety of substrates.

Identifying the problem

Applying fluoropolymer coatings involves several considerations. Among the more critical design issues are friction, wear, release properties, corrosion, and noise.

Friction causes heat, wear, and loss of energy in dynamic applications. In severe cases, friction can cause overheating and bearing seizure. Other effects include drive-line vibration and chatter. In these cases, stick-slip motion is usually the cause. This unstable sliding motion occurs at slow speeds, when movement starts and stops as dynamic friction rises above, then falls below, static friction.

Excessive friction harms bearing applications by producing galling, abrasion, and high energy loss. To minimize friction in these cases, consider applying coatings to at least a thickness of 25 microns or 0.001 in. Instrument bearings or other systems in which minimum bearing friction is critical can benefit from a thinner coating (7.5 microns or 0.0003 in.).

Bolted joints also suffer from too much friction, since tightening torque must be used to overcome thread-to-thread and bearing face friction. If a bolt is not properly tensioned in these situations, the joint can become weak in service. Coating the threads reduces the makeup torque by up to 50% and allows tensioning to be done more accurately.

Fluoropolymer coatings overcome friction in the internal components of automobile engines as well, where fluids and dry-film lubricants were

used in the past. High temperatures often melted or degraded these materials. although temperatures often surge over 600[degrees]F inside the engine, new fluoropolymer coating formulas handle the job without breaking down.

Wear is inevitable when two bearing surfaces rub against each other. Mating metal parts have minute peaks called asperities on their surfaces before they meet. Initial contact between them causes a momentary welding of the asperities. As each part continues to move, the welded asperities are ripped off, leaving behind minute pits. No matter how smooth the finish, every bearing and wear surface has this problem. Coatings provide a thin layer of lubrication that prevents asperities on mating surfaces from making contact.

The rate of wear is influenced by the pressure surfaces exert against each other, the velocity at which they move, the length of time they are in contact, and a wear factor constant unique for each combination of surfaces.

The amount of wear and service life is proportional to PV factors (P=pressure, V=velocity) below a certain limit. This limiting PV factor is the point at which increasing P or V converts normal wear into accelerated wear, often leading to catastrophic failure of a bearing.

Several factors influence the limiting PV factor, including temperature. Surfaces moving in contact generate heat, which must be dissipated if the bearing is to survive. Coatings and lubricants reduce the rate of heat generation and help preserve the bearing. All bearing materials, including coatings, must be used below their limiting PV factor to avoid failure.

Release properties or nonstick should not be confused with low friction. Friction results from two surfaces sliding across each other, while release is a surface property that results in the inability of substances to adhere to it. It is a function of surface energy that can be measured by the angle of contact between the surface and a drop of liquid. The larger the contact angle, the greater release property a coating has.

Cookware is often coated to release food materials. But release is equally vital to industrial processes such as thermoforming, rubber molding, automotive and adhesive assemblies, and copying machines. In these applications, buildup of foreign particles is a far greater problem than high bearing loads or corrosion. Examples include carburetor shafts, choke plungers, butterfly spindles, conveyor parts, and instrument probes.

Corrosion can result from single or multiple sources. This complex electrochemical process typically occurs when an oxidizing agent attacks metal. the agents range from salt water and wetting agents to fuels and synthetic lubricants. Joining dissimilar metals causes galvanic corrosion, and vibration between tightly joined parts causes a type of corrosion called fretting.

Fluoropolymer coating offer a simple solution to corrosion problems when applied at 25 micron or 0.001-in. thickness. But to cover microscopic pin holes that may occur in the coating, two thin layers can be applied. Even if corrosives eventually penetrate the coating and attack the substrate, little or no underburrowing occurs, so the parts may still be easily disassembled for refurbishing.

For example, in spite of their appearance, heavily corroded fasteners remain functional if they are coated prior to placing them in service. There are several coating formulas developed specifically for fasteners that are used in the chemical processing and automotive industries.

Noise comes from vibration sources such as high-speed impeller blades, gear teeth, bearings, piston skirts, actuator plungers, and reciprocating detents. Coatings dampen the vibrations by absorbing energy and transmitting the reduced energy to resonant surfaces.

In most cases, noise is effectively dampened by coatings 25 to 40 microns thick. When corrosion is not a consideration, these films may be applied in one coat, although thicker coats absorb more energy. If noise

damping is the primary problem, multiple coats will achieve the best vibration reduction. Avoid excessive thickness, however, to prevent delamination or tearing.

Pretreatment guidelines

Coatings are only as good as the care exercised when they are applied. Following a few guidelines ensures that coatings perform as intended.

Cleaning and pretreatment are important. It is essential to clean every surface to be coated because few coatings adhere to dirty or oily substrates. There are many ways to clean a part, each with advantages and disadvantages. Some techniques go beyond simple cleaning and create surface structures that enable a coating to cling better to the part.

Vapor degreasing use to be the most widely used cleaning technique, but fell into disfavor because of regulatory restrictions on solvents. Where permitted, degreasing remains an excellent method for removing a wide variety of foreign material, from fingerprints to machine oils. It is an economical technique for cleaning small batches of parts. Avoid using it on parts that may be attacked by the solvent, such as plastics, composites, or metal parts with organic inserts.

Grit blasting or tumble blasting with aluminum oxide or other abrasive particles is another common way to clean parts. This method is best for removing rust, scale, corrosion, old coatings, and any contaminant that must be attacked physically to be removed. It is not the most effective way to remove oily or fluid contaminants, however. When parts are particularly oily, alkaline cleaning or prebaking before blasting will improve effectiveness of the blast.

In addition to cleaning, grit blasting roughens the surface and enhances mechanical adhesion by increasing the surface area to which a coating can cling. Most metal parts require a grit medium from 60 to 120 mesh. Steel grit is generally avoided because minute particles left behind can become starting points for oxidation.

Tumble blasting is another variation in which small parts are placed into a rotating cylinder where an abrasive medium is blown against the surfaces.

Shot blasting is similar to grit blasting, but typically uses metal shot as the blast medium. This process imparts residual compressive stress on the part surface. For parts in fatigue or fretting applications with cyclic loads, this lengthens their lives.

Alkaline washing involves cleaning parts with neutral, moderate, or high-pH cleaners. This is preferred for high-volume parts and is generally as effective as vapor degreasing. Materials such as aluminum, magnesium, and other active metals that have the potential to be adversely affected by the chemistry of alkaline washing should be carefully evaluated prior to using high pH cleaners.

Acid or alkaline etching, a variation, cleans and roughens the surface of aluminum parts. But it is reserved for high volumes because it requires considerable equipment.

Secondary surface preparations include pickling, phosphating, and anodizing. Pickling removes rust and scale from ferrous parts after cleaning, but should not be used on highly loaded parts because it can cause hydrogen embrittlement. Phosphating, also performed on steel parts after cleaning, promotes better adhesion and increases resistance to corrosion and chemicals. Conversion coating, or anodizing, serves a similar function for aluminum, but produces a harder surface than phosphating.

Pretreatment combinations are required for the best overall coating adhesion and corrosion protection. Industry practice for common substrates includes:

- * Carbon steel - alkaline wash/grit blast/phosphate
- * Aluminum - alkaline wash/etch or grit blast
- * Stainless steel - heat oxidize/grit blast/etch
- * Chrome and nickel plate - alkaline wash/prebake/grit blast

Applying solutions

Preheating parts prior to coating removes condensation that can form on cool parts in humid atmospheres. It is also useful for parts with large mass, in which oven dwell times to bring them up to temperature would not be economical. Preheat part parts only to a maximum of 125 [degrees]F. Higher temperatures will cause solvents in the coating to volatilize too quickly, causing defects in the finish.

The next step in coating parts is to choose an application method. Choices depend on part shape, number of parts, required transfer efficiency, application rate, and type of carrier used in the formula.

Spraying is by far the most versatile and widely used technique. Conventional spraying covers small numbers of parts where considerable manual work is required. HVLP, or High Volume, Low Pressure, is a variation that reduces air pressure and increases liquid volume. This efficiency also reduces the number of volatile organic compounds (VOCs) released.

Airless spraying uses hydraulic pressure to move and atomize liquid instead of air. Pressure pot method, where the coating is under positive pressure, exerts more pressure than a conventional system for larger production runs. Electrostatic spraying, recommended for high production runs or complex shapes, coats rods, wires, outdoor furniture, and other parts that require a 360 [degrees] coating.

Bulk techniques are the most economical ways to apply coatings to small and intricate parts such as fasteners, clips, or other irregularly shaped pieces. Transfer efficiency is high - as much as 95% of the coating is applied to parts. Bulk techniques operate in two basic ways - dip/spin and barrel/tumble.

In dip/spin coating, a basket filled with parts is immersed in a reservoir half filled with coating. The basket is then raised out of the coating and spins to carry away excess fluid. Because parts are in contact with each other, two passes are needed to ensure total coverage. For lightweight or flat parts like washers or small O-rings, parts are tumbled and sprayed while hot air passes over them. This eliminates the problem of nesting common with these types of parts.

High-volume techniques include coil and curtain coating. High-speed rollers in a coil coating system apply precise film thicknesses to a wide continuous sheet of metal. This process is often used for cookware, bakeware, and small appliances. Curtain coaters pass parts through a falling curtain of coating fluid, but it is difficult to control coating thickness and placement.

Curing

After coatings are applied, they must be flashed and cured. Flashing is done at elevated temperature, but lower than the cure temperature, to vaporize the coating's carrier. Then parts are cured so that coating particles can link into a tough, continuous film.

The curing process depends on a time/temperature relationship: the higher the temperature, the shorter the curing time required. Altering the time/temperature relationship can affect the amount of cure.

Convection systems use heated air to cure coatings. They are the most common type of curing system. Sophisticated production ovens that use conveyors to move parts usually have at least three heat zones within them: a warmup zone, a bake zone, and a heat extraction zone.

Infrared systems are not used as often because the heating elements tends to become glazed by the fumes given off during the process. As they become covered, the elements radiate less energy and become ineffective. But these systems are very effective for flat or shallow parts.

Curing schedules vary for different formulas, depending on the resin binder used and other factors. Most coatings, however, permit wide latitude in cure temperatures so the cure can be compatible with the part. For instance, you may limit the cure temperature of a die cast part to 350 [degrees] F or of a formed aluminum part to 450 [degrees] F.

THE PROBLEM

WITH VOC'S

Volatile Organic Compounds are those ingredients in a paint or coating defined as photochemically reactive by the U.S. Environmental Protection Agency. They escape into the atmosphere during drying or curing. With few exceptions, all organic solvents are classified as VOCs.

The coatings described in this article come under the "extreme performance" industry classification. This includes coatings designed for constant exposure to weather, temperatures above 203[degrees]F, detergents, abrasive or scouring agents, solvents, corrosive atmospheres, or similar environmental conditions. Extreme performance coatings have the following limits on VOCs:

- * Pigmented coatings, normal use 3.0 lb/gal
- * Pigmented coatings, extreme performance 3.5 lb/gal
- * Clear coatings 4.3 lb/gal

Note: Some states measure VOC limits in metric terms (g/l). To make the conversion, multiply lb/gal by 120.

To calculate VOC content,

$$\text{VOCs} = \text{Density (lb/gal)} \times (1 - \% \text{ solids by weight}).$$

For waterborne coatings, VOCs are calculated without water and other exempt compounds. The formula becomes:

$$\text{VOCs} = [\text{Density (lb/gal)} \times (1 - \% \text{ solids by weight} - \% \text{ water by weight})] / (1 - \% \text{ water by volume}).$$

In most areas, regulations permit averaging the VOCs emitted during a 24-hour period. The means if you use a low-VOC material, you can also use the same amount of a high-VOC material providing the total amount produced during that period does not exceed local limits.

HOW MUCH DOES A

COATING COST?

The answer to that question goes beyond the cost of the material alone. Materials may be only a small part of the total coating cost because of the labor needed to mask, rack, coat or multicoat, and package.

Judging price by the cost of a gallon, liter, or kilo usually leads to cost overruns. In fact, low-cost coating materials often come with a higher price per unit area of coverage. The best way to compare the cost of a coating is to determine the cost of covering a given area at a specific film thickness, normally 25 microns or 0.001 in.

What gives a coating its coverage? The answer is the amount of volume solids it contains. But few coatings contain the same amount of solids. Furthermore, there are a variety of solid materials, each having a different weight. When the coating is cured and the liquids are driven off, only the solids remain. Thus, solid ingredients that are denser than others don't cover as much area by weight. Coverage depends on the area and thickness of the coating. This is volume, not weight. Weight solids are different, so don't confuse the two.

Changes mandated by various VOC regulations have generally increased the cost per gallon by increasing the amount of solids in a coating. The good news is that the coatings will now cover greater unit areas, offsetting the apparent increase in cost.

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FLUORESCENCE EMISSION RATIO IMAGING THERMOGRAPHY FOR USE IN HEAT TRANSFER ANALYSIS

THERMOGRAPHIE PAR IMAGE-RATIO A EMISSION FLUORESCENTE POUVANT ETRE UTILISEE DANS UNE ANALYSE PAR TRANSFERT DE CHALEUR

Patent and Priority Information (Country, Number, Date):

Patent: WO 200323343 A1 20030320 (WO 0323343)
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English Abstract

The present invention provides a fluorescent imaging thermographic method and system for use in surface temperature measurements, which are reproducible over time. The invention provides a temperature-sensitive fluorescent probe (23) comprising a rare earth compound in an ultraviolet and fluorescence transparent medium (25) in order for the intensity of the fluorescence to vary as the temperature varies. The probe comprises Eu (1,1,1,5,5,5-hexafluoroacetylacetone)"sub"3 for measuring temperatures greater than 24 degreesC, and Tb (1,1,1,5,5,5-hexafluoroacetylacetone)"sub"3 for measuring temperatures less than 24 degreesC. The probe is applied as a layer to a surface (22) and exposed to fluorescence-inducing energy (10), then the emitted fluorescence is measured (12) and a ratio-imaging algorithm determines the temperature at each location on the surface.

French Abstract

L'invention concerne un procede et un systeme thermographiques d'imagerie par fluorescence utilisables dans des mesures de temperature en surface, et pouvant etre reproduits au fil du temps. L'invention concerne une sonde fluorescente thermosensible (23) contenant un compose de terres rares dans un milieu ultraviolet et transparent par fluorescence (25), si bien que l'intensite de la fluorescence varie en meme temps que la temperature. La sonde comprend: Eu (1,1,1,5,5,5-hexafluoroacetylacetone)"sub"3 pour mesurer des temperatures superieures a 24 degreesC, et Tb (1,1,1,5,5,5-hexafluoroacetylacetone)"sub"3 pour mesurer des temperatures inferieures a 24 degreesC. La sonde est appliquee sous forme de couche sur une surface (22) et exposee a une energie generatrice de fluorescence (10), puis la fluorescence emise est mesuree (12) et un algorithme d'image-ratio determine la temperature a chaque emplacement sur la surface.

Fulltext Availability:

Detailed Description

Detailed Description

... was filtered and dried for 24 hours at 700 C,

Film application methods are primarily determined by the costs, film thickness, appearance requirements, and structure of the object to be coated.

Several commonly used methods such...

21/TI,PN,PD,AN,AD,AB,K/12 (Item 1 from file: 348)
DIALOG(R)File 348:(c) 2003 European Patent Office. All rts. reserv.

Substrate with zinc oxide layer, method for producing zinc oxide layer, photovoltaic device, and method for producing photovoltaic device

Substrat mit Zinkoxidschicht und Herstellungsverfahren der Zinkoxidschicht,
photovoltaisches Bauelement und dessen Herstellungsverfahren
Substrat comportant une couche d'oxyde de zinc et son procede de
fabrication, dispositif photovoltaique et son procede de fabrication
PATENT (CC, No, Kind, Date): EP 932207 A2 990728 (Basic)
APPLICATION (CC, No, Date): EP 99101228 990122;
PRIORITY (CC, No, Date): JP 2518098 980123; JP 2518198 980123

ABSTRACT EP 932207 A2

Provided are a substrate with a zinc oxide layer, in which at least a zinc oxide layer is provided on a support substrate, wherein the zinc oxide layer comprises a zinc oxide layer having the c axis perpendicular to the support substrate and a zinc oxide layer having the c axis slantindicular to the support substrate in the order from the side of the support substrate; and a photovoltaic device in which a semiconductor layer is formed on the substrate with the zinc oxide layer. Thus provided is the inexpensive photovoltaic device with excellent reflective performance and optical confinement effect and with high photoelectric conversion efficiency.

...SPECIFICATION the thick zinc oxide layer thereon by the electrodeposition method. Conceptually, it is possible to **determine cost** distribution in proportion to the thickness. For example, if the **thickness** of the sputtered **film** is 10 or less % of the total thickness, the cost impact due to the sputtering...

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